Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Hierarchically Structured Block Copolymer \ Silicate Nanocomposites ROSS BEHLING, ERIC COCHRAN, Iowa State University — In this contribution we functionalized MMT with a bromine terminated alkylamine and subsequently polymerized polystyrene-*b*-poly(tert-butyl acrylate) via graft-from atom transfer radical polymerization. Hierarchical assembly of these composites was facilitated through targeted graft density, polymer block size, and MMT intrinsic properties. The high graft density on the MMT surface results in confinement effects which force growing polymer chains into highly extended conformations. Block copolymer (BCP) brushes were chosen because they inherently offer an easily tunable method for producing self-assembled structures on the order of tens of nanometer. Montmorillonite (MMT) in its raw state is composed of negatively charged tactoid stacks 100-300 nm in diameter and 1-2 nm thick resulting in BCP\silicate nanocomposites particles arranged under shear into structures spanning several hundreds of nanometers. The equilibrium structures were influenced by the MMT platelet curvature and the BCP interaction parameter, χ. BCP nanocomposites were observed via transmission electron microscopy to display novel morphologies with multiple systems exhibiting interpenetrating networks reminiscent of "worm micelles".

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Date submitted: 17 Nov 2008 Electronic form version 1.4